WHAT IS CLAIMED IS:

1. A stereoscopic image displaying method, wherein, when image information displayed on an image displaying device is observed three-dimensionally by guiding display light from an image corresponding to a viewpoint of one parallax image on said image displaying device, on which parallax images corresponding to a plurality of different viewpoints can be displayed, to an optical modulator, on which a light transmitting section and a light shielding section can be formed, by a second optical system disposed in the front of said image displaying device, and collecting the display light transmitted through said light transmitting section of said optical modulator at a position, which is a predetermined distance apart, corresponding to the viewpoint on an observation surface, by a first optical system, the entire screen of a parallax image to be displayed on said image displaying device is caused to be incident on each eye by controlling transmitted light from said optical modulator in synchronism with the switching of parallax images to be displayed on said image displaying device.

2. A stereoscopic image displaying method according to claim 1, wherein

a first synthesized parallax image in which one

stripe image is synthesized by dividing two parallax images for the right and the left eyes to horizontal stripe pixels, respectively, and arranging horizontal stripe pixels for the left and the right eyes in a predetermined order, and a second synthesized parallax image that is an interpolation image of said first synthesized parallax image which is synthesized by changing its order of arrangement are alternately displayed on said image displaying device.

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3. A stereoscopic image displaying method according to claim 2, wherein

the change of said synthesized parallax image to be displayed on said image displaying device and the control for forming said light transmitting section and said light shielding section are performed synchronously for each pixel of said image displaying device or each scan line.

4. A stereoscopic image displaying method according to claim 1, 2 or 3, wherein

said optical modulator uses a liquid crystal shutter that has pixels of a matrix structure or an oblong pixel structure.

5. A stereoscopic image displaying method according to claim 1, wherein

two parallax images for the right and the left eyes are alternately displayed on said image displaying device.

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6. A stereoscopic image displaying method according to claim 1, wherein

said image displaying device emits predetermined polarized light.

7. A stereoscopic image displaying method according to claim 6, wherein

said optical modulator has a first phase shift member for giving two different phase shift states to transmitted light by an electric signal and a polarized optical device for partially transmitting predetermined polarized light only which is provided in a predetermined position to the front of said first phase shift member.

8. A stereoscopic image displaying method according to claim 7, wherein

said polarized optical device is configured by arranging two polarization plates on which optical axes are perpendicular to each other in a checkered pattern.

9. A stereoscopic image displaying method according to claim 7, wherein

said polarized optical device is configured by alternately arranging two polarization plates on which optical axes are perpendicular to each other in the horizontal direction in a stripe pattern that is long in the vertical direction.

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10. A stereoscopic image displaying method according to claim 7, 8 or 9, wherein

said polarized optical device comprises a second phase shift member and a polarizing plate, and its phase is processed as 0 and π in a pattern in which said second phase shift member is arranged in a checkered pattern or a stripe pattern that is long in the vertical direction.

11. A stereoscopic image displaying method according to claim 6, wherein

said optical modulator has a first phase shift member for giving two different phase shift states to transmitted light by an electric signal, and said first shift member is arranged between said image displaying device and said second optical system.

12. A stereoscopic image displaying method according to claim 6, wherein

said image displaying device has an automatic light emission display apparatus and a polarizing plate.

13. A stereoscopic image displaying method according to claim 1, wherein

a 2D image (an image without parallax) is displayed on a part of or the entirety of said image displaying device.

14. A stereoscopic image displaying method according to claim 1, wherein

said second optical system focuses an image of said image displaying device on said optical modulator in the vertical direction, and a focal point position of said second optical system and the position of said optical modulator substantially coincide with each other in the horizontal direction.

15. A stereoscopic image displaying method according to claim 1, wherein

said first optical system and said second optical system have predetermined periodic structures in the horizontal direction, and said second optical system and/or said image displaying device are disposed on a face on which a multiplicity of straight lines cross, which connect the left and the right pupils and the center in the horizontal direction of each optical element forming said first optical system.

16. A stereoscopic image displaying method

according to claim 1, wherein

said second optical system has a predetermined periodic structure in the horizontal and vertical directions, respectively, and said optical element forming one period in the horizontal and vertical directions has optical actions that are different in the horizontal direction and the vertical direction.

17. A stereoscopic image displaying method according to claim 1, wherein

a crossing point of a multiplicity of straight lines that connect the left and the right pupils and the center in the horizontal direction of each optical element forming said first optical system, and the center in the horizontal direction of each optical device forming said second optical system coincide with each other, and/or the center in the horizontal direction of pixels forming said image displaying device coincide with them.

18. A stereoscopic image displaying method according to any one of claims 1, 2, 3 and 5, wherein

when the left and the right pupils are apart by an interval E, a period in the horizontal direction of said optical element forming said first optical system is HL1, a width in the horizontal direction of said light transmitting section of said optical modulator is

Hm, a period in the horizontal direction of said optical element forming said second optical system is HL2, a pixel pitch in the horizontal direction of said image displaying device is Hd, optical distances between said first optical system and said second optical system and said first optical system and said image displaying device are LhL2 and Lhd, respectively, an optical distance from the observation surface to said first optical system is Lh0, an optical distance from a crossing face that is the first one counted from said first optical system in the direction to said image displaying device among faces on which a group of light beams connecting the left and the right pupils and each pixel of said image displaying device cross is Lh1, an optical distance from said first optical system to said optical modulator is Lh1a, an optical distance from said first optical system to a crossing face that is the first one counted from said first optical system in the direction to said image displaying device is Lh1b, and both Nd and NL2 are integral numbers of 2 or more, the following relation is realized:

$$Nd*HL1/E=Lhd/(Lhd+Lh0) \quad \ldots (h1)$$

$$Hd/HL1=(Lh0+Lhd)/Lh0 \quad \ldots (h2)$$

$$NL2*HL1/E=LhL2/(LhL2+Lh0) \quad \ldots (h3)$$

$$HL2/HL1=(Lh0+LhL2)/Lh0 \quad \ldots (h4)$$

$$H1/E=Lh1/(Lh1+Lh0) \quad \ldots (h5)$$

$$H1/HL1=(Lh1+Lh0)/Lh0 \quad \ldots (h6)$$

$$H1*Lh1a/Lh1=HL1*Lh1b/Lh1 \quad \ldots \quad (h7)$$

$$Lh1a+Lh1b=Lh1 \quad \ldots \quad (h8)$$

$$Hm/H1=Lh1a/Lh1 \quad \ldots \quad (h9)$$

19. A stereoscopic image displaying method according to claim 4, wherein

when the left and the right pupils are apart by an interval E, a period in the horizontal direction of said optical element forming said first optical system is HL1, a width in the horizontal direction of said light transmitting section of said optical modulator is Hm, a period in the horizontal direction of said optical element forming said second optical system is HL2, a pixel pitch in the horizontal direction of said image displaying device is Hd, optical distances between said first optical system and said second optical system and said first optical system and said image displaying device are LhL2 and Lhd, respectively, an optical distance from the observation surface to said first optical system is Lh0, an optical distance from a crossing face that is the first one counted from said first optical system in the direction to said image displaying device among faces on which a group of light beams connecting the left and the right pupils and each pixel of said image displaying device cross is Lh1, an optical distance from said first optical system to said optical modulator is Lh1a, an optical distance

from said first optical system to a crossing face that is the first one counted from said first optical system in the direction to said image displaying device is Lh1b, and both Nd and NL2 are integral numbers of 2 or more, the following relation is realized:

$$Nd*HL1/E=Lhd/(Ldh+Lh0) \quad \ldots (h1)$$

$$Hd/HL1=(Lh0+Lhd)/Lh0 \quad \ldots (h2)$$

$$NL2*HL1/E=LhL2/(LhL2+Lh0) \quad \ldots (h3)$$

$$HL2/HL1=(Lh0+LhL2)/Lh0 \quad \ldots (h4)$$

$$H1/E=Lh1/(Lh1+Lh0) \quad \ldots (h5)$$

$$H1/HL1=(Lh1+Lh0)/Lh0 \quad \ldots (h6)$$

$$H1*Lh1a/Lh1=HL1*Lh1b/Lh1 \quad \ldots (h7)$$

$$Lh1a+Lh1b=Lh1 \quad \ldots (h8)$$

$$Hm/H1=Lh1a/Lh1 \quad \ldots (h9)$$

20. A stereoscopic image displaying method according to any one of claims 1, 2, 3 and 5, wherein

when a pixel pitch in the vertical direction of said image displaying device is Vd, a width in the vertical direction of said light transmitting section or said light shielding section of said optical modulator is Vm, an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is Lv1, an optical distance from a face having optical actions in the vertical direction of said second optical system to said optical modulator is Lv2, a

focal distance in the vertical direction of each optical element forming said second optical system is fv, and an optical distance between said optical modulator and an observation surface is Lv0, the following relation is realized:

$$Vd:Vm=Lv1:Lv2 \quad \ldots (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \quad \ldots (v2)$$

$$1/Lv1+1/Lv2=1/fv \quad \ldots (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \quad \ldots (v4)$$

21. A stereoscopic image displaying method according to claim 4, wherein

when a pixel pitch in the vertical direction of said image displaying device is Vd, a width in the vertical direction of said light transmitting section or said light shielding section of said optical modulator is Vm, an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is Lv1, an optical distance from a face having optical actions in the vertical direction of said second optical system to said optical modulator is Lv2, a focal distance in the vertical direction of each optical element forming said second optical system is fv, and an optical distance between said optical modulator and an observation surface is Lv0, the following relation is realized:

$$Vd:Vm=Lv1:Lv2 \quad \ldots \quad (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \quad \ldots \quad (v2)$$

$$1/Lv1+1/Lv2=1/fv \quad \ldots \quad (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \quad \ldots \quad (v4)$$

22. A stereoscopic image displaying method according to claim 18, wherein

when a pixel pitch in the vertical direction of said image displaying device is Vd, a width in the vertical direction of said light transmitting section or said light shielding section of said optical modulator is Vm, an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is Lv1, an optical distance from a face having optical actions in the vertical direction of said second optical system to said optical modulator is Lv2, a focal distance in the vertical direction of each optical element forming said second optical system is fv, and an optical distance between said optical modulator and an observation surface is Lv0, the following relation is realized:

$$Vd:Vm=Lv1:Lv2 \quad \ldots \quad (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \quad \ldots \quad (v2)$$

$$1/Lv1+1/Lv2=1/fv \quad \ldots \quad (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \quad \ldots \quad (v4)$$

23. A stereoscopic image displaying method according to claim 19, wherein

when a pixel pitch in the vertical direction of said image displaying device is Vd, a width in the vertical direction of said light transmitting section or said light shielding section of said optical modulator is Vm, an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is Lv1, an optical distance from a face having optical actions in the vertical direction of said second optical system to said optical modulator is Lv2, a focal distance in the vertical direction of each optical element forming said second optical system is fv, and an optical distance between said optical modulator and an observation surface is Lv0, the following relation is realized:

$$Vd:Vm=Lv1:Lv2 \quad \ldots (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \quad \ldots (v2)$$

$$1/Lv1+1/Lv2=1/fv \quad \ldots (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \quad \ldots (v4)$$

24. A stereoscopic image displaying method according to any one of claims 1 through 3, 5 through 9 and 11 through 17, wherein

said first and second optical systems have lenticular lenses.

25. A stereoscopic image displaying method according to claim 4, wherein

said first and second optical systems have lenticular lenses.

26. A stereoscopic image displaying method according to claim 10, wherein

said first and second optical systems have lenticular lenses.

27. A stereoscopic image displaying method according to claim 18, wherein

said first and second optical systems have lenticular lenses.

28. A stereoscopic image displaying method according to claim 19, wherein

said first and second optical systems have lenticular lenses.

29. A stereoscopic image displaying method, wherein each of parallax images corresponding to a plurality of different viewpoints is made a predetermined stripe image, display light, which is from a stripe image corresponding to one viewpoint of a synthesized parallax image on an image displaying device that can alternately display a synthesized

parallax image in which the stripe images is arranged in a predetermined order and synthesized and a synthesized parallax image in which the arrangement is changed, is guided to an optical modulator, which is formed in synchronism with the change of a synthesized parallax image that displays a predetermined pitch of light transmitting section and light shielding section by a second optical system disposed in the front of said image displaying device, display light that has transmitted through said light transmitting section of said optical modulator are collected at a position corresponding to a viewpoint on an observation face by a first optical system, and stereoscopic observation of image information displayed on said image displaying device is thereby performed.

30. A stereoscopic image displaying method according to claim 29, wherein

display light reaching a viewpoint position of an observer that correspond to the stripe image among said display light emitted from pixels forming each of said stripe image is collected in said optical modulator so as to be transmitted through said light shielding section of said optical modulator by said second optical system, and the other light is shielded by said light shielding section.

31. A stereoscopic image displaying method according to claim 29 or 30, wherein

said second optical system forms an image of pixels of said image displaying device on said optical modulator in the vertical direction, and a focal point position and the position of said optical modulator substantially coincide with each other in the horizontal direction.

32. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to any one of claims 1 through 3, 5 through 9 and 11 through 17 is used.

33. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 4 is used.

34. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 10 is used.

35. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 18 is used.

36. A stereoscopic image displaying apparatus,

wherein a stereoscopic image displaying method according to claim 19 is used.

37. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to any one of claim 29 or 30 is used.

38. A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 31 is used.